Maria (Masha) Okounkova

Curriculum Vitae

Flatiron Institute, 162 5th Ave
New York, NY, 10010
☎ *+1 (609) 933 7509*
✉ *mokounkova@flatironinstitute.org*
mariaokounkova.github.io/
she/her, US Citizen

Interests

Gravitational wave astrophysics, computational physics and astrophysics, general relativity, numerical relativity, black holes, neutron stars, testing general relativity with gravitational wave astronomy

Inclusive and welcoming teaching and mentorship, increasing diversity in physics, astrophysics, and astronomy

Academic positions

Aug 2019 - present **Flatiron Institute Center for Computational Astrophysics (CCA)**, *Flatiron Research Fellow*, Member of Gravitational Waves and Compact Objects groups.

Education

2014 - 2019 **California Institute of Technology (Caltech)**, PhD in physics.
advised by Saul Teukolsky

2010 - 2014 **Princeton University**, B.A. in physics, certificate in applications of computing.
magna cum laude

Scientific Collaboration Memberships

Simulating eXtreme Spacetimes (SXS), *Numerical relativity.*
LIGO Scientific Collaboration (LSC), *Gravitational wave observation and data analysis.*
LISA (Laser Interferometer Space Antenna), *Next generation gravitational wave detector.*

Selected Publications

[14] **Maria Okounkova**, Will Farr, Maximilliano Isi, Leo C. Stein. *Constraining gravitational wave amplitude birefringence and Chern-Simons gravity with GWTC-2.* arXiv:2101.11153 Accepted to Phys. Rev. D., Jan 2021

[13] **Maria Okounkova**. *Revisiting non-linearity in binary black hole mergers.* arXiv:2004.00671 Submitted to Phys. Rev. D., Apr 2020

[12] **Maria Okounkova**. *Numerical relativity simulation of GW150914 in Einstein dilaton Gauss-Bonnet gravity.* Phys. Rev. D 102:084046, Oct 2020

[11] **Maria Okounkova**, Leo C. Stein, Jordan Moxon, Mark A. Scheel, and Saul A. Teukolsky. *Numerical relativity simulation of GW150914 beyond general relativity.* Phys. Rev. D 101:104016, May 2020

[10] Enrico Barausse et al. (inc. **Maria Okounkova**). *Prospects for Fundamental Physics with LISA.* Gen. Rel. Grav 52(8):81, Aug 2020

[9] **Maria Okounkova**. *Stability of rotating black holes in Einstein dilaton Gauss-Bonnet gravity.* Phys. Rev. D 100:124054, Dec 2019

[8] **Maria Okounkova**, Leo C. Stein, Mark A. Scheel, and Saul A. Teukolsky. *Numerical binary black hole collisions in dynamical Chern-Simons gravity.* Phys. Rev. D 100:104026, Nov 2019

[7] Rana X. Adhikari et al. (inc. **Maria Okounkova**). *Astrophysical science metrics for next-generation gravitational-wave detectors.* Class. Quant. Grav. 36 245010, Nov 2019

[6] Michael Boyle et al. (inc. **Maria Okounkova**), *The SXS Collaboration catalog of binary black hole simulations* Class. Quant. Grav., April 2019

[5] **Maria Okounkova**, Mark A. Scheel, and Saul A. Teukolsky. *Evolving Metric Perturbations in dynamical Chern-Simons Gravity.* Phys. Rev. D 99:044019, Feb 2019

[4] **Maria Okounkova**, Mark A. Scheel, and Saul A. Teukolsky. *Numerical black hole initial data and shadows in dynamical Chern-Simons gravity.* Class. Quant. Grav., Feb 2019

[3] Swetha Bhagwat, **Maria Okounkova***, Stefan W. Ballmer, Duncan A. Brown, Matthew Giesler, Mark A. Scheel, and Saul A. Teukolsky. *On choosing the start time of binary black hole ringdowns.* Phys. Rev. D 97:104065, May 2018.

[2] **Maria Okounkova**, Leo C. Stein, Mark A. Scheel, and Daniel A. Hemberger. *Numerical binary black hole mergers in dynamical Chern-Simons gravity: Scalar field.* Phys. Rev. D 96:044020, Aug 2017.

[1] Paolo Agnes et al. (inc. **Maria Okounkova**), *First Results from the DarkSide-50 Dark Matter Experiment at Laboratori Nazionali del Gran Sasso.* Phys. Lett. B 743:456, Feb 2015.

*** lead authors alphabetical**

Upcoming Publications

[2] **Maria Okounkova**, Francois Hebert, Katerina Chatziioannou, Jordan Moxon, Leo Stein, Saul Teukolsky *Connecting the strong field dynamics of binary black hole mergers to gravitational waveforms at infinity using ray-tracing.* In prep, to be submitted to Phys. Rev. D.

[1] **Maria Okounkova**, Maximilliano Isi, Katerina Chatziioannou, Will Farr. *Searching for binary black hole mergers beyond general relativity.* In prep, to be submitted to Phys. Rev. D.

Invited Talks and Invited Workshops

Jul 2022 **Centro de Ciencias de Benasque**, New frontiers in strong gravity workshop.

Jan 2022 **Harvey Mudd College**, Physics Colloquium.

Oct 2021 **University of Cambridge, DAMTP**, General Relativity Seminar.

Sep 2021 **Perimeter Institute**, Strong Gravity Seminar.

Jul 2021 **Sapienza University of Rome**, Gravity Theory Seminar.

Apr 2021 **Universitat de les Illes Balears**, Seminar.

Feb 2021 **Caltech**, Tapir Seminar.

Dec 2020 **SISSA Trieste**, Gravity Seminar.

Dec 2020 **TCNJ**, Physics Colloquium.

Nov 2020 **Columbia University**, Theory Group Seminar.

Oct 2020 **ICERM (Institute for Computational and Experimental Research in Mathematics), Brown University**, Mathematical and Computational Approaches for Solving the Source- Free Einstein Field Equations Workshop.

Sep 2020 **ICERM (Institute for Computational and Experimental Research in Mathematics), Brown University**, Advances and Challenges in Computational Relativity Workshop.

Aug - Sep 2020 **KITP (Kavli Institute of Theoretical Physics), UC Santa Barbara** , Probing Effective Theories of Gravity in Strong Fields and Cosmology Workshop.

Aug 2020 **University of Mississippi**, Special seminar.

June 2020 **Canadian Institute for Theoretical Astrophysics**, CITA seminar.

July 2020 **Centro de Ciencias de Benasque**, New frontiers in Strong Gravity workshop, *Cancelled due to Covid-19 pandemic.*

June 2020 **University of Rome**, Strong Gravity Beyond workshop, *Cancelled due to Covid-19 pandemic.*

Dec 2019 **NYU**, Guest lecture in general relativity course.

Nov 2019 **University of Amsterdam**, Gravitational Wave Probes of Fundamental Physics workshop.

Oct 2019 **NYU Center for Cosmology and Particle Physics**, Astro seminar.

Dec 2018 **Cornell University**, Gravity Lunch Seminar.

Nov 2018 **UT Austin**, Invited Seminar.

Nov 2018 **Princeton University**, Princeton Gravity Initiative Lunch Seminar.

Sep 2018 **Perimeter Institute**, Strong Gravity Seminar.

Aug 2018 **CSU Fullerton**, GWPAC High Performance Computing Workshop.

July 2018 **Simons Summer Workshop**, Forefronts in Cosmology and Numerical General Relativity.

June 2018 **Centro de Ciencias de Benasque**, Numerical Relativity beyond General Relativity workshop.

April 2018 **Caltech**, Theoretical astrophysics seminar.

Jan 2018 **Keck Institute for Space Sciences**, The Architecture of LISA Science Analysis.

Dec 2017 **Caltech**, LIGO seminar.

Honors

June 2019 **Kip Thorne Prize**, *for Excellence in Theoretical Physics*, Caltech.

June 2018 **John Stager Stemple Memorial Prize**, *for best performance on oral candidacy exam and research progress*, Caltech.

Mar 2018 **American Physical Society DGRAV prize**, *for best student talk at PCGM34*, Caltech.

Oct 2017 **Oculus Prize**, *Maestro team*, Hack Music LA.

Oct 2017 **Amazon Prize**, *Maestro team*, Hack Music LA.

2014-2016 **Dominic Orr Graduate Fellowship**, *full funding for first two years of research*, Caltech.

July 2016 **Hartle Award**, *for best talk in numerical relativity session*, GR21 conference.

Nov 2015 **Theoretical Astrophysics in Southern California prize**, *for best student talk*, Cal State Fullerton.

June 2014 **Kusaka Memorial Prize in Physics**, *for top graduating seniors in physics*, Princeton University.

June 2013 **Allen G. Shenstone Prize in Physics**, *for top juniors in physics*, Princeton University.

Service and Leadership

Summer 2020 - present **Anti-racist pedagogy reading group organizer**, Organizing bi-weekly reading discussions centered around increasing diversity in teaching physics and astronomy., CCA.

2019 - present **Executive committee member**, *Simulating eXtreme Spacetimes collaboration.*

2019 - present **Student-Postdoc Advocate**, *Simulating eXtreme Spacetimes collaboration.*

2019 - present **Journal Referee**, *APS Physical Review D, APS Physical Review Letters, Classical and Quantum Gravity.*

2017-2019 **Organizing committee member**, *Caltech/JPL Association for Gravitational-Wave Research.*

2018 **Conference organizer**, *Pacific Coast Gravity Meeting (PCGM) 34*, Caltech.

2016-2017 **Graduate student organizer**, *Theoretical astrophysics including relativity group*, Caltech.

2015-2016 **Numerical relativity group discussion leader**, Caltech.

Student Mentorship

Summer 2021 - present **Lawrence Edmond**, *Undergraduate student at UC Berkeley*, supervising on project on ray-tracing geodesics in black hole and binary black hole spacetimes, Simons-NSBP program.

Summer 2020 - present **Destiny Howell**, *Undergraduate student at CUNY Hunter College*, co-supervising on project on analyzing spins in LIGO-Virgo catalog data, AstroCom NYC program.

Summer 2020 - Spring 2021 **William Chakalis**, *Undergraduate student at CUNY Hunter College*, co-supervised on project on detecting binary eccentricity in LIGO-Virgo , AstroCom NYC program.

Summer 2016 **Nicholas Meyer**, *Undergraduate student at Caltech*, supervised on project on binary black hole ringdowns, Caltech SURF program.

Teaching and mentorship

Summer 2021 - present **Simons-NSBP mentor**, Mentoring student members of the National Society of Black Physicists in computational general relativity projects, CCA.

Summer 2020 - present **AstroCom NYC mentor**, Mentoring CUNY undergraduate students in projects in black hole and gravitational wave astrophysics., CCA / CUNY.

2016-2017 **Teaching Assistant**, Computational physics sequence (Ph20: Introduction to the Tools of Scientific Computing, Ph21: Tools for Data Analysis, Ph 22: Tools for Numerical Methods), Caltech.

Summer 2016 **Caltech SURF mentor**, Mentoring Caltech undergraduates in computational general relativity projects, Caltech.

2012-2014 **Laboratory Teaching Assistant**, Computer science sequence (COS 126: Introduction to Computer Science, COS 217: Introduction to Programming Systems, COS 226: Algorithms and Data Structures), Princeton University.

Outreach

I regularly participate in community science nights at local schools, guest lectures in high school and college courses, and astronomy outreach events including Astronomy on Tap. For an example of my public outreach talks to a general audience, please see a lecture on computational physics I gave at Caltech. For an example of my outreach talks to K-12 students, please see one of the Ask-a-Scientist discussions I led at the Flatiron Institute.

References

Prof. Saul Teukolsky
Caltech | Cornell
saul@astro.cornell.edu

Prof. Will Farr
Flatiron CCA | Stony Brook University
wfarr@flatironinstitute.org

Asst. Prof. Leo Stein
University of Mississippi
leo.stein@gmail.com

Prof. K.E. Saavik Ford
American Museum of Natural History | CUNY | CCA
sford@amnh.org
*Teaching Reference